

What is claimed is:

1. A vehicle radar apparatus comprising:

transmitting means for transmitting a transmission signal which is
5 frequency modulated so as to change continuously in frequency;

a plurality of receiving means, disposed at predetermined intervals,
for receiving reflected waves when said transmission signal is reflected by
an objective and for generating a plurality of received signals;

beat signal generating means for generating beat signals each
10 corresponding to a frequency difference between said transmission signal
and each of said received signals generated from said plurality of receiving
means;

converting means for extracting a peak frequency of at least one beat
signal generated from said beat signal generating means and for converting a
15 phase difference of the beat signal at said peak frequency into a frequency
signal; and

judging means for identifying said objective with a close range road
surface or raindrops when a peak frequency intensity of said frequency
signal converted by said converting means is smaller than a predetermined
20 criterion intensity.

2. The vehicle radar apparatus in accordance with claim 1, wherein
said judging means determines said predetermined criterion intensity with
reference to the peak frequency intensity of said beat signal.

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3. The vehicle radar apparatus in accordance with claim 1, wherein
said judging means determines said predetermined criterion intensity with
reference to an average intensity which is obtained by averaging the peak
frequency intensity of respective beat signals.

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4. The vehicle radar apparatus in accordance with claim 1, wherein
said transmission signal includes an ascending section in which the
frequency ascends in a predetermined frequency range and a descending
section in which the frequency descends in another predetermined frequency
5 range,

said converting means extracts, as the peak frequency of said beat
signal, an ascending section peak frequency and a descending section peak
frequency in said ascending section and said descending section of said
transmission signal, respectively, and converts the phase difference of
10 respective beat signals at said ascending section peak frequency and said
descending section peak frequency into an ascending section frequency
signal and a descending section frequency signal,

said judging means identifies said objective with the close range road
surface or the raindrops when an ascending section peak frequency intensity
15 of said ascending section frequency signal is smaller than a predetermined
criterion intensity determined with reference to an ascending section peak
frequency intensity of said beat signal, and when a descending section peak
frequency intensity of said descending section frequency signal is smaller
than a predetermined criterion intensity determined with reference to a
20 descending section peak frequency intensity of said beat signal.

5. The vehicle radar apparatus in accordance with claim 1, wherein
said judging means executes judging processing for comparing the peak
frequency intensity of said frequency signal with said predetermined
25 criterion intensity only when the peak frequency of said beat signal is
generated in a predetermined low-frequency region.

6. The vehicle radar apparatus in accordance with claim 5, further
comprising speed detecting means for detecting a vehicle traveling speed,
30 wherein said judging means changes the range of said low-frequency

region in accordance with the vehicle traveling speed detected by said speed detecting means.

7. The vehicle radar apparatus in accordance with claim 1, wherein
5 said converting means calculates the intensity of each frequency by executing frequency analysis on each beat signal, and extracts the peak frequency of said beat signal based on the result obtained by averaging the calculated intensity of said each frequency among respective beat signals.

10 8. The vehicle radar apparatus in accordance with claim 1, wherein said judging means repetitively executes judging processing for comparing the peak frequency intensity of said frequency signal with said predetermined criterion intensity at predetermined periods, and identifies
15 said objective with the close range road surface or the raindrops based on judgment result obtained through a plurality of comparisons.